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BUREAU OF MINES MINERALS YEARBOOK

The Mineral Industry of Idaho



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This publication is a chapter from the current Bureau of Mines Minerals Yearbook, comprising *Volume I, Metals and Minerals*; *Volume II, Area Reports: Domestic*; *Volume III, Area Reports: International*. The separate volumes of the Yearbook are sold by the Superintendent of Documents, Washington, D.C. 20402.

The Mineral Industry of Idaho

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Idaho Geological Survey for collecting information on all nonfuel minerals.

By W. L. Rice¹ and E. H. Bennett²

Idaho's nonfuel mineral production value decreased to \$270 million in 1987, down slightly from the 1986 total. A significant rise in the value of gold production and lesser increases in the production values for

crushed stone, construction sand and gravel, vanadium, and garnet were insufficient to offset decreases in the value of phosphate rock, silver, and molybdenum production.

Table 1.—Nonfuel mineral production in Idaho¹

Mineral	1985		1986		1987	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ² thousand short tons	2	W	2	W	22	\$230
Copper (recoverable content of ores, etc.) metric tons	3,551	\$5,242	W	W	W	W
Gem stones NA	NA	*175	NA	\$305	NA	507
Gold (recoverable content of ores, etc.) troy ounces	44,306	14,074	70,440	25,938	97,773	43,797
Lead (recoverable content of ores, etc.) metric tons	33,707	14,169	9,951	4,836	W	W
Lime thousand short tons	93	5,803	89	4,729	97	5,149
Phosphate rock thousand metric tons	3,784	104,000	*4,235	*82,332	3,411	47,072
Sand and gravel (construction) thousand short tons	*4,000	*11,400	5,708	14,830	*7,200	*28,000
Silver (recoverable content of ores, etc.) thousand troy ounces	18,828	115,645	11,297	61,301	W	W
Stone (crushed) thousand short tons	2,019	6,977	*3,700	*12,700	3,852	15,346
Zinc (recoverable content of ores, etc.) metric tons	W	W	351	294	W	W
Combined value of antimony (1985-86), cement, clays/bentonite, common clay, fire clay, and kaolin (1985-86); garnet (abrasive), molybdenum, perlite, pumice, sand and gravel (industrial), stone (dimension), vanadium, and values indicated by symbol W	XX	81,181	XX	66,783	XX	129,272
Total	XX	358,666	XX	*274,048	XX	269,373

¹Estimated. ²Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" figure. XX Not applicable.

³Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

⁴Excludes certain clays; kind and value included with "Combined value" data.

Table 2.—Nonfuel minerals produced in Idaho in 1986, by county¹

County	Minerals produced in order of value
Ada	Sand and gravel
Bannock	Cement, sand and gravel
Benewah	Sand and gravel
Bingham	Phosphate rock, sand and gravel
Blaine	Sand and gravel
Bonner	Do
Bonneville	Sand and gravel, pumice
Boundary	Sand and gravel
Canyon	Sand and gravel
Caribou	Phosphate rock, sand and gravel
Cassia	Sand and gravel
Clark	Clays
Custer	Molybdenum, silver, lead, gold, copper
Franklin	Sand and gravel
Fremont	Do
Gem	Do
Gooding	Do
Idaho	Sand and gravel, gold, silver
Kootenai	Sand and gravel
Latah	Clays, sand and gravel
Lincoln	Sand and gravel
Madison	Do
Minidoka	Do
Nez Perce	Do
Oneida	Pumice, perlite
Owyhee	Gold, silver, sand and gravel
Power	Sand and gravel
Shoshone	Silver, lead, copper, gold, antimony, zinc
Teton	Sand and gravel
Twin Falls	Do
Valley	Gold, silver, sand and gravel
Washington	Sand and gravel
Undistributed ²	Stone, gem stones, vanadium

¹No production of nonfuel mineral commodities was reported for counties not listed²Data not available by county for minerals listed.

Silver was the leading mineral commodity in terms of value, followed by phosphate rock, gold, and molybdenum. The metallic minerals—copper, gold, lead, molybdenum, silver, vanadium, and zinc—accounted for 58% of the State's total nonfuel mineral value for the year, compared with 52% in 1986, and 59% in both 1985 and 1984. Idaho ranked first in the Nation in garnet and vanadium production; second in silver output; third in the production of phosphate rock, molybdenum, and lead; and fourth in pumice production. The State ranked 31st nationally in the value of nonfuel minerals production in 1987; it was 32d in 1986.

Trends and Developments.—Depressed silver prices, persisting through the first quarter of 1987, precluded an early reopening of Idaho silver mines closed during 1986. Beginning the year at \$5.44 per troy ounce, silver reached a high of about \$9.66 per ounce in late April and averaged \$7.01 per ounce for the year. By yearend, three Coeur d'Alene District mines had reopened, although full production was not expected from two of the operations until well into 1988. Two of the reopened mines, which had produced about 25% of new domestic silver in 1985, required a silver price of about \$7.00 per ounce to operate profitably. Idaho produced 21% of the Nation's new silver in 1987, compared with nearly 33% in 1986 and almost 48% in 1985.

Idaho's molybdenum production decreased again in 1987, in response to a worldwide oversupply of the metal and a glut of tariff-free, low-cost imports from Chile and Mexico.

Idaho's gold production was up significantly for the second consecutive year. The first full year of production from a major new mine, a full year's output from a past producer reopened in 1986, and sustained full-scale production from a southwestern Idaho gold-silver mine were primary reasons for the increase. Exploration for gold increased in the State during 1987, and several deposits were advanced to the development stage.

Employment.—The reopening of three silver mines and one phosphate operation during the last half of 1987 was insufficient to offset mining personnel cutbacks at Cyprus Minerals Co.'s Thompson Creek molybdenum mine and at other operations, resulting in a second year of decreased employment in Idaho's mineral sector. Metal mining employment declined to 1,600 workers, almost 16% below the 1986 employment figure; overall mining employment fell by nearly 14%, to 2,500 workers. Average weekly earnings in 1987 for Idaho's mineral industry production workers was \$608, the highest of all production workers in the State.

According to data supplied by the State of

Idaho Department of Employment, average weekly wages for mineral industry production workers in the Coeur d'Alene District, Shoshone County, decreased to \$492 in 1987, compared with the weekly average wage of \$673 paid in 1986. Reflecting the reopening of the silver mines, Shoshone County mining employment increased from 687 workers in January to 943 employees at yearend.

Environmental Issues.—In January, the U.S. Environmental Protection Agency (EPA) released the Bunker Hill Site Remedial Investigation Study Work Plan. The plan covered a phase of the eventual Superfund cleanup of mining-related hazardous wastes in a 21-square-mile area in the Coeur d'Alene District, Shoshone County. The EPA-sponsored study estimated that 36,500 tons of hazardous waste, containing lead, beryllium, cadmium, mercury, arsenic, asbestos, and polychlorinated biphenyls (PCB) remain at the Bunker Hill smelter site near Kellogg. Gulf Resources & Chemical Corp., former owner of the Bunker Hill operation, assumed responsibility for cleanup studies in unpopulated areas of the Superfund site, including the dormant Bunker Hill Mine and smelter complex. The Idaho Department of Health and Welfare, responsible for cleanup studies in populated areas, selected the CH2M Hill engineering firm as contractor for the work. Total cost for the entire cleanup, which would take several more years, was estimated at \$50 million.

In April, the Ninth U.S. Circuit Court of Appeals ruled that the State of Idaho could sue past operators of the Blackbird Mine at Cobalt, Lemhi County, for environmental damages to the Panther Creek drainage. The State contended that the mine operators, Noranda Mines Ltd., Noranda Exploration Inc., Hanna Mining Co., and Howmet Turbine Corp., were responsible for mining-related water pollution. Idaho sought up to \$25 million for environmental damages.

Exploration Activities.—Mineral exploration increased in Idaho in 1987; gold deposits again were the primary targets. The total number of major mineral exploration programs nearly doubled to 61 from the 38 recorded for 1986. By yearend, 78,469 active mining claims were on file with the U.S. Bureau of Land Management (BLM). Counties with the highest exploration activity were Blaine, Boise, Custer, Idaho, and Shoshone.

Silver exploration in the Coeur d'Alene mining region recovered slightly from the depressed level of 1986. Underground explo-

ration resumed in August at Callahan Mining Corp.'s long-term Caladay Project near Wallace. The new \$4 million program called for 2,600 feet of drifting on two levels, and 6,900 feet of underground diamond drilling; Callahan's earlier exploration efforts at the Caladay cost \$26.6 million, including \$21 million for the shaft and \$5.6 million for drifting and drilling. Teck Resources (U.S.) Inc. completed the last phase of a 5,000-foot-deep navi-drill hole to investigate the silver potential of the Blue Jay mineralized zone at the Gem State-Rock Creek claims.

Cominco American Incorporated drilled on claims north of the Golden Chest Mine near Murray, Shoshone County. The Newmont Mining Corp.-TAP Resources Ltd. joint venture began a drilling program in August to investigate a possible low-grade, mass-minable gold deposit on the Golden Chest property. Sundance Mining-Development Corp. conducted a preliminary surface exploration program for gold at the Wake Up Jim property near Murray. Cominco also examined three properties in the St. Joe area, including drilling programs at Granite Peak and Moores Saddle.

In Lemhi County, FMC Gold Co. continued a gold exploration drilling at Ditch Creek and drilled 11 holes on the Freeman Creek property leased from St. Joe Minerals Corp. Canyon Resources Corp. drilled a new prospect on Beartrack Creek north of Leesburg and was to continue evaluation of the site in 1988. Metron Resources drilled on the Porphyry Ridge property south of the Blackbird Mine and shipped 4,600 short tons of ore to Clayton Silver Mines for mill testing. Noranda Exploration examined the old Kittie Burton and Ulysses Mines in the Indian Creek District, and West Fork Gold Mining Co. drilled on the West Fork of Indian Creek. In the Gibbonsville District, Lemhi County, Northwest Mineral Development Corp. trenched and drilled on the Wagonhammer claims. Merger Mines Inc. explored underground at the Cyanide Gulch property, and Eagle Claw Mining Co. completed a 400-foot-long drift at the Clara Morris Mine.

Alotta Resources Ltd. drilled about 75 reverse-circulation holes at the Mineral Zone project north of Elk City, Idaho County. In October, Billiton Exploration USA Inc. joint-ventured into the project. Drilling continued until late in the year. Estimated reserves at the Mineral Zone property were 1.95 million tons grading 0.055 ounce of gold per ton. Silver Crystal Mines Inc. explored

4,700 acres of claims surrounding the Umattilla Mine west of Orogrande; the property was being explored for gold and platinum. Summit Silver Inc. continued work at the Kimberly Mine in the Marshall Lakes District, and E & E Exploration drilled on an extensive claim block in the Florence Basin, Idaho County.

Meridian Minerals Co. continued a gold exploration program at Middle Mountain, south of Oakley, Cassia County, with efforts centered on volcanic rocks in the Cold Creek Zone and on a fossil sinter in the Blue Hill Zone. Antilles Resources (Exvenco) drilled a gold target in Robber's Gulch, and American Copper & Nickel Co. Inc. drilled on a large claim block south of Antilles' holdings.

GEXA Gold Corp. (Galli Exploration) continued drilling for precious metals in Hardscrabble Gulch, Rocky Bar District, Elmore County. Richweld Resources Ltd. completed diamond drilling at the Blackstone Mine, and discovered new mineralized zones outside the old open pit. J & D Lode and Placer sank an inclined shaft at the Competence Mine in the Neal District; the company was exploring for an extension of known mineralized shear zones.

Billiton Exploration drilled a gold exploration target in the Illinois shear zone in the Gambrinus District and Frontino Corp. continued an exploration program at the Ophir Mine near Idaho City, Boise County. The old Lincoln Mine in the Pearl-Horseshoe Bend District was leased by Union-Eagle Resources Inc.; the company was negotiating with Morrison-Knudsen Co. Inc. for a feasibility study.

Chevron Resources Co. drilled for gold on claims north of the Craters of the Moon National Monument, Butte County, and Cominco explored in Long Canyon north of the Chevron property. Oglebay Norton Co. drilled for base and precious metals on Elkhorn Mountain, Oneida County.

Meridian Minerals continued drilling in the Mink Creek-Scout Mountain area south of Pocatello, and Freeport-McMoRan Gold Co. drilled on an epithermal gold target at Malad Summit, Bannock County.

Chevron drilled nine holes at the Thirsty Mountain gold-mercury prospect near Haystack Peak north of Weiser, Washington County. War Eagle Mining Co. drilled on a large landholding near Silver City, Owyhee County, where the company controls many of the old silver mines.

An exploration program at Rothchild

Corp.'s Vienna Mine was successful, and mining was scheduled to begin in the spring of 1988; the ore will be processed at Rothchild's mill near Ketchum, Blaine County. Yanke Machine Shop Inc. explored underground at the Greyhound Mine, Custer County, and ran test batches from a new precious-metals ore shoot through the Greyhound mill.

Amselco Exploration Inc. drilled 44 holes and expanded a claim block at the Golden Gate tungsten mine south of Yellowpine, Valley County. Amselco was exploring the area for precious metals targets. High County Mining Corp. drilled the KT and DC claims on Quartz Creek near Elk Summit, north of Yellowpine.

In the Pend Oreille silver-lead district, Bonner County, the Iron Mask Mining Co. explored underground by crosscutting, raising, and diamond drilling. Shoshone Silver Mining Co. drove a 500-foot-long exploration tunnel at the Idaho Lakeview claims, and Merger Mines explored by drifting at the Cedar Mountain property.

Legislation and Government Programs.—The first regular session of the 49th Idaho State Legislature passed legislation authorizing regulation of the use of cyanide in precious metals recovery. Near yearend, the Idaho Division of Environment, Department of Health and Welfare, completed work on rules and regulations for ore processing by cyanidation. These rules were the first in the Western States to establish engineering, operating, water-quality monitoring, and reclamation standards for precious metals cyanidation, especially in heap leaching. Compiled by a coalition of representatives from the Idaho Mining Association, the Idaho Division of Environment, the Idaho Conservation League, and the EPA, the pioneering rules became effective January 1, 1988.

An Idaho wilderness bill, introduced in Congress in March, called for the addition of 3.9 million acres to the State's existing 3.8 million acres of wilderness. The bill was not enacted. In late December, Idaho's Governor and a member of the State's congressional delegation proposed the addition of 1.3 to 1.4 million acres as official wilderness and the placing of another 300,000 acres in special management units. This legislation was to be introduced into the Senate in early 1988.

The Mining and Mineral Resources Institute of the University of Idaho received \$225,000 from the U.S. Bureau of Mines in

1987; the institute has received a total of nearly \$2.73 million from the Bureau since inception of the program in 1978. During the year, the University of Idaho assisted the Virginia Polytechnic Institute in work on mine systems design and ground control.

The U.S. Department of Energy's Idaho National Engineering Laboratory received

\$3.8 million from the U.S. Bureau of Mines to continue a multiyear extractive metallurgy and materials technology research and development program on strategic and critical minerals.

Idaho received nearly \$1.42 million from BLM in 1987 from receipts collected under the Mineral Leasing Act.

REVIEW BY NONFUEL MINERAL COMMODITIES

METALS

Antimony.—Idaho was the only State reporting domestic antimony production in 1987. American Independence Mines & Minerals Co. reported a small amount of antimony production from the Antimony Rainbow Mine, Valley County. The Sunshine Mine, normally the top domestic producer of antimony as byproduct from silver production, was shut down for the entire year.

Copper.—In 1987, production of copper, predominantly a byproduct from silver recovery in the Coeur d'Alene District, decreased slightly in quantity but increased in value from that of 1986. Production was reported from five mines in 1987; the largest producers were the Galena, Coeur, and Lucky Friday Mines, which accounted for more than 99% of the total State copper output. Additional small production was reported from Adams and Custer Counties.

Gold.—Gold production in Idaho increased by approximately 39% in quantity and by almost 70% in value from the 1986 levels. Production was recorded from 10 lode mines during the year, unchanged from that of 1986. Pioneer Metals Corp.'s seasonal Stibnite Mine, Valley County, again was the State's first-ranked producer. The company's annual report lists 1987 production from the open pit, heap-leach operation at approximately 36,500 troy ounces of gold and 22,400 troy ounces of silver from oxidized ore.

Production from Pioneer's West End pit ended in 1987; subsequent production will be from the Garnet Creek and Southwest Extension ore bodies. Since startup in 1982, the Stibnite Mine has produced approximately 128,500 ounces of gold and 67,400 ounces of silver. Drilling in 1987 confirmed the existence of additional minable oxide reserves adjacent to existing workings. The potential of sulfide ore underlying the oxide ore bodies was being evaluated; approxi-

mately 30,000 tons of sulfide material grading 0.1 ounce of gold per ton was stockpiled and sampled for metallurgical testing.

NERCO Minerals Co.'s DeLamar gold-silver mine, Owyhee County, was the second-ranked producer. According to the company's annual 10K report, 1987 production from the open pit, vat-leach operation amounted to 30,000 ounces of gold and 1,733,000 ounces of silver. The North DeLamar pit was largely mined out in 1987; subsequent production will come from the Sommercamp and Glen Silver pits. During the year, a \$2.5 million Merrill Crowe-process heap-leach plant was constructed to treat 2 to 3 million tons of stockpiled low-grade ore, plus an additional 1 million tons of mined low-grade material per year for 7 years.

Coeur d'Alene Mines completed the first full season of production at the Thunder Mountain Mine, Valley County. The \$18.7 million open pit heap-leach operation, sited at an elevation of about 8,500 feet, is limited to a 6-month operating season, from May through October. The company reported that it exceeded its first full-season production goal of 25,000 ounces of gold with 27,250 ounces of gold and 31,840 ounces of silver. A 1987 exploration program revealed 73,100 tons of new proven and probable ore in the adjacent Lightning Peak area. The proven ore, totaling 650,000 tons grading 0.041 ounce of gold per ton, should extend the mine's life by 2 years.

Other Idaho gold projects advancing to the development or construction stage during 1987 included Geodome Resources Ltd.'s Sunbeam Mine, Custer County; Hecla Mining Co.'s heap-leach project on the Homestake property, Valley County; the joint venture by Glamis Gold Inc., Amir Mines Ltd., and Normine Resources Ltd. at Buffalo Gulch, Idaho County; Canyon Resources (merged with Nevex Gold Inc.) heap-leach operation at the Robinson Dyke deposit, Idaho County; Atlanta Gold Co.'s

major drilling program at a proposed open pit operation, Elmore County; Ican Minerals Ltd. at the old Idaho Almaden mercury property, Washington County; Atlantis Mining Co.'s Atlantis Mine, Blaine County; and Noranda Exploration's Black Pine cyanide leach project, Cassia County.

Lead.—Idaho ranked third in the Nation in lead production for 1987, although the quantity produced was a small fraction of the national total. Idaho's lead production, a byproduct of silver mining, reflected the continued slump in silver production. Three mines reported lead production in 1987; the bulk came from the Lucky Friday Mine, Shoshone County.

Molybdenum.—Reflecting the stagnant condition of the worldwide molybdenum market, Idaho's 1987 production dropped slightly. The State retained its third ranking nationally in production of the metal. Production at Cyprus Minerals' Thompson Creek Mine, near Clayton, Custer County, was scaled back. The Bonneville Power Administration's low-rate program to help economically distressed industrial users was expected to be of long-term benefit to Thompson Creek.

Rare Earths.—Attention was drawn in 1987 to rare-earth-bearing black sand placer deposits in Boise, Custer, and Valley Counties, central Idaho. A U.S. Geological Survey open file report, based on drilling data generated by the U.S. Bureau of Mines in the 1950's, stated that 23 identified rare-earth deposits contain more than 540,000 short tons of monazite with lesser quantities of euxenite, and 5.2 million tons of ilmenite. The monazite and euxenite carry lanthanum and yttrium, currently used in superconductor research. The placer minerals would have to be recovered by dredging, however, and many of the deposits are in environmentally sensitive areas.

Silver.—Idaho's silver production decreased in both volume and value compared with that of 1986. The State lost its dominant position in domestic silver production, slipping behind Nevada. The revival of silver prices in 1987 did not lead to an immediate restarting of Idaho silver mines closed in 1986. Three mines in the Coeur d'Alene District, accounted for nearly 78% of total State output reported from 10 mines.

ASARCO Incorporated's Galena Mine, near Wallace, was the Nation's third-ranked silver producer in 1987, while the company's nearby Coeur Mine ranked sixth. Production from the Galena Mine decreased

from the 1986 level, according to Asarco's annual report, to about 3.3 million ounces of silver and 1,000 tons of copper.

Production at Asarco's Coeur Mine also decreased in 1987, to about 2.5 million ounces of silver and 1,100 tons of copper. Hecla's Lucky Friday Mine, at Mullan, resumed production in June, after a 10-month closure. The company reported production of 667,000 ounces of silver and 4,500 tons of lead in 1987. The new Lucky Friday underhand longwall mining method, developed jointly by Hecla and the U.S. Bureau of Mines, was implemented on the 5300 level. The method utilized mechanized equipment, a ramp system, and cemented sand fill to prevent rock bursts and to lower mining costs. A new 3-year labor agreement was reached in late July, calling for a 15% reduction in wages and benefits. Further wage reductions become effective in the second year of the contract in return for worker participation in a profit-sharing program. Sunshine Mining Co.'s Sunshine Mine on Big Creek, shut down in mid-April 1986 owing to depressed silver prices, began to reopen in December. The Crescent Mine, also on Big Creek and owned by the Bunker Limited Partnership, reopened for exploration and development work in October. In early July, Callahan reactivated its Caladay Project adjacent to the Galena Mine. Expenditure for the second phase of the underground exploration program was projected to be \$4 million over the next 20 months; plans included approximately 2,600 feet of drifting and 6,900 feet of diamond drilling.

Vanadium.—Vanadium production in Idaho increased nearly 4% in quantity and almost 27% in value; the State ranked first nationally in the production of vanadium in 1987. Kerr-McGee Chemical Corp. expanded its Soda Springs vanadium recovery plant, Caribou County, during the last half of the year. The operation recovered vanadium from ferrophosphorus slag generated during the production of elemental phosphorus. The expanded plant produced potassium vanadate used as a catalyst in sulfuric acid manufacture, a super-pure vanadium compound used in alloying high-strength metals, and material used in making maleic hydride.

Zinc.—Zinc production in the State, which was byproduct of silver mining in 1987, increased substantially in both quantity and value from that reported in 1986. The sole zinc producer was the Lucky Friday Mine.

INDUSTRIAL MINERALS

Cement.—Idaho's cement production decreased slightly in 1987. Ash Grove Cement West, at Inkam, Bannock County, was the State's only cement producer. Most of the cement produced was general use, moderate heat Types I and II gray portland cement; lesser quantities of Type III high-early-strength portland cement and masonry cement also were produced. Finished portland cement was used by ready-mixed concrete companies, 70%; other contractors, 11%; highway contractors, 5%; and building material dealers, miscellaneous customers, and government agencies, 4%.

Clays.—Bentonite, common clay, and kaolin were mined from five pits in Clark and Latah Counties; the clays were used in the manufacture of common brick, fire brick, and in refractory grogs. Production increased about 6% in quantity and by 11% in value.

Diatomite.—American Diatomite Co. began development on deposits of freshwater diatomite north of Bliss, Gooding County. The company planned to mine 75,000 short tons of diatomite during the first year of operation; mining could extend into the 1990's and expand from the current 5 acres to 25 acres.

Garnet.—Idaho ranked first in the Nation in garnet production. The Emerald Creek Garnet Milling Co. at Fernwood, Benewah County, operated at capacity during 1987. The company operated dragline-dredge-washing plants on Emerald and Carpenter Creeks; the garnet was recovered by jigging and trucked to the Fernwood plant for drying, crushing, sizing, and packaging. Emerald Creek Garnet was the largest domestic producer of garnet. The product was sold for abrasives, as a filtration medium, for sandblasting, and as the cutting medium for high-pressure water-garnet steel cutting. About 25% of the company's sales were to foreign customers.

Gem Stones.—The value of 1987 gem stone production in Idaho increased to \$507,000, compared with the \$305,000 total for 1986; the State ranked seventh nationally in the value of its gem stone production. Precious opals, jasper, aquamarine, topaz, gem quartz, and gem garnets were mined in the State.

Lime.—Amalgamated Sugar Co.'s three lime plants in Canyon, Minidoka, and Twin Falls Counties accounted for all of the State's 1987 lime production. Quicklime production for sugar manufacture was up

nearly 9% in both quantity and value from that of 1986.

Perlite.—Oglebay Norton Co. purchased the Oneida Perlite Corp. operation in 1987. The company mined perlite from a deposit on Wrights Creek; the material was processed at the Malad City plant, Oneida County. The expanded product was used for industrial fillers, in fireproofing, and as a filtering medium. Much of the Wrights Creek area is underlain by perlite deposits; during the year, the U.S. Forest Service reopened an 80-acre tract previously closed to mineral entry.

Phosphate Rock.—Idaho retained its third rank nationally in marketable phosphate rock production, although the output decreased by about 19% in quantity and 43% in value from the 1986 levels. A decline in both domestic and export selling prices, a generally depressed market for agricultural products and phosphate fertilizers, and the shutdown for most of the year of a major Idaho fertilizer producer and reduced production of another, accounted for the reductions in quantity and value of production. Five open pit phosphate mines in Bingham and Caribou Counties were operated in 1987. Uses for Idaho phosphate were wet-process phosphoric acid, elemental phosphorus, and normal superphosphate.

NuWest Industries Inc. purchased the bankrupt Beker Industries Corp. Conda phosphate fertilizer facility in July. The \$50 million purchase price secured the fertilizer plant and a 50% interest in the Conda Partnership mining rights. The operation was restarted in August and operated at 50% to 70% of capacity for the remainder of 1987.

The J. R. Simplot Co. operated the Smoky Canyon Mine at a reduced rate, and also produced phosphate rock from the Gay Mine on the Fort Hall Indian Reservation. Simplot completed work on a 15-year, \$30 million program to reduce sulfur dioxide emissions from its Pocatello phosphate fertilizer complex. Monsanto Co. mined phosphate rock at the Henry Mine and operated its Soda Springs elemental phosphorus plant at capacity in 1987. The company completed installation of stack scrubbers at the plant, finishing a \$12 million pollution control program.

FMC Corp. completed the second year of a \$13 million program to control emissions at its Pocatello elemental phosphorus plant. Stauffer Chemical Co. mined phosphate rock from the Wooley Valley Mine, north-

east of Soda Springs, for shipment to its elemental phosphorus plant at Silver Bow, MT.

Pumice.—Idaho remained fourth nationally in the production of pumice. Output in 1987 increased in quantity by nearly 38%, and in value by almost 20%. Two operations in Bonneville County and one in Oneida County accounted for the State's output. Hess Pumice Products, Idaho's largest pumice producer, operated its mine on Wrights Creek near Malad City, Oneida County. The company, a major national producer of ground pumice products, sold processed pumice for abrasives in soap and cleaners, for industrial abrasives, and for aggregate in lightweight building blocks. The second-largest producer was Producers Pumice, from the Rock Hollow Mine near Ammon, Bonneville County.

Sand and Gravel.—Construction.—Construction sand and gravel production is surveyed by the U.S. Bureau of Mines for even-numbered years only; this chapter contains estimates for 1985 and 1987, and actual data for 1986. Data for odd-numbered years are based on annual company estimates.

Estimated 1987 construction sand and gravel production increased approximately 26% in quantity and almost doubled in

value from that reported in 1986. Increased activity in highway and secondary road construction and maintenance contributed significantly to the increase.

Industrial.—Industrial sand production in Idaho increased slightly in quantity and decreased a small amount in value from that of 1986. Unimin Corp. produced industrial sand and gravel at the Emmett operation, Gem County. Industrial sand was used in glass containers, for sandblasting, as a filtration medium, in fiberglass manufacture, for roofing granules, and for other applications.

Stone.—Stone production is surveyed by the U.S. Bureau of Mines for odd-numbered years only; this chapter contains actual data for 1985 and 1987 and estimates for 1986. Data for even-numbered years are based on annual company estimates.

Crushed.—The 1987 output of crushed stone in Idaho increased by 4% in quantity and by about 21% in value from the levels estimated in 1986, and nearly doubled in value from the level reported in 1985. Six counties—Benewah, Caribou, Fremont, Idaho, Latah, and Nez Perce—accounted for 83% of the State total. Idaho, Caribou, and Bannock Counties were the leading producers.

Table 3.—Idaho: Crushed stone¹ sold or used by producers in 1987, by use

(Thousand short tons and thousand dollars)

Use	Quantity	Value
Coarse aggregate (+ 1-1/2 inch):		
Riprap and jetty stone	16	47
Filter stone	3	12
Other coarse aggregate	11	11
Fine aggregate (-3/8 inch): Screening, undesignated	12	24
Coarse and fine aggregates:		
Graded road base or subbase	1,807	5,790
Unpaved road surfacing	393	1,556
Other construction materials ²	476	1,761
Agricultural:		
Poultry grit and mineral food	4	11
Other agricultural uses	21	63
Chemical and metallurgical:		
Chemical stone	(3)	(3)
Sulfur oxide removal	(3)	(3)
Refractory stone (including gannister)	25	70
Special:		
Roofing granules	(3)	(3)
Other miscellaneous ⁴	533	3,025
Other unspecified ⁵	551	2,974
Total	3,852	*15,346

¹Includes limestone, dolomite, granite, sandstone, quartzite, and traprock.

²Includes concrete aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, stone sand (concrete), stone (bituminous mix or seal), and crusher run or fill or waste.

³Less than 1/2 unit.

⁴Includes cement manufacture and flux stone.

⁵Includes production reported without a breakdown by end use and estimates for nonrespondents.

*Data do not add to total shown because of independent rounding.

Lava Flow Productions Inc. operated a scoria specialty products quarry near Mountain Home, Elmore County. The scoria was processed and either sold in bulk to landscape nurseries or rescreened and sorted for Lava Flow's specialty markets, which included barbecue rock, aquarium stone, roofing products, potting mixes, and roadbeds for model railroads.

Dimension.—Dimension stone output was up by nearly 63%, but the value decreased by nearly 75% from that of 1986. Quartzite was quarried by Northern Stone Supply Inc. near Oakley, Cassia County, for flagstone and decorative stone.

¹State Mineral Officer, Bureau of Mines, Spokane, WA.

²Associate director, Idaho Geological Survey, Moscow, ID.

Table 4.—Principal producers

Commodity and company	Address	Type of activity	County
Cement:			
Ash Grove Cement West Inc.	5550 S.W. Macadam Ave. Suite 300 Portland, OR 97201	Surface mine and plant.	Bannock
Clays:			
Clayburn Industries Ltd.	3202 Beta Burnaby, BC, Canada	Surface mine . . .	Latah.
A. P. Green Refractories Co., a subsidiary of USC Corp.	Box 158 Troy, ID 83871	do	Do.
Interpace Corp.	3502 Breakwater Court Hayward, CA 94545	do	Benewah.
Copper:			
ASARCO Incorporated	Box 440 Wallace, ID 83873	Mines and mills .	Shoshone.
Hecla Mining Co.	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	Mine and mill . .	Do.
Garnet:			
Emerald Creek Garnet Milling Co. Inc.	Route 4, Box 190 Fernwood, ID 83830	Pits and plant. . .	Benewah.
Gold:			
Coeur d'Alene Mines Corp.	505 Front Ave. Box 1 Coeur d'Alene, ID 83814	Surface mine and leach plant.	Valley.
Hecla Mining Co.	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	Mine and mill. . .	Shoshone.
NERCO Minerals Co.	111 SW Columbia Portland, OR 97201	Surface mine, mill, leach plant.	Owyhee.
Pioneer Metals Corp.	228 South Cole Rd. Boise, ID 83709-0934	Surface mine and leach plant.	Valley.
Lead:			
Hecla Mining Co.	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	Mine and mill. . .	Shoshone.
Lime:			
Amalgamated Sugar Co.	First Security Bank Bldg. Ogden, UT 84402	Plants	Various.
Molybdenum:			
Cyprus Minerals Co.	7200 South Alton Way Englewood, CO 80110	Surface mine and mill.	Custer.
Perlite:			
Oglebay Norton Co.	520 North Michigan Ave. Chicago, IL 60611	Surface mine and plant.	Oneida.
Phosphate rock:			
Conda Partnership	Box 37 Conda, ID 83230	do	Caribou.
Monsanto Co.	Box 816 Soda Springs, ID 83276	Surface mine . . .	Do.
J. R. Simplot Co.	Box 912 Pocatello, ID 83201	Surface mines and plant.	Bingham and Caribou.
Stauffer Chemical Co.	Box 160 Montpelier, ID 83254	Surface mine . . .	Caribou.
Pumice:			
Hess Pumice Products.	Box 209 Malad City, ID 83252	Quarry and plant	Oneida.
Producers Pumice	6001 Fairview Ave. Boise, ID 83704	Quarry	Bonneville.
Sand and gravel (industrial):			
Unimin Corp.	258 Elm St. New Canaan, CT 06840	Pit	Gem.

Table 4.—Principal producers —Continued

Commodity and company	Address	Type of activity	County
Silver:			
ASARCO Incorporated	Box 440 Wallace, ID 83873	Mines and mills	Shoshone.
Hecla Mining Co	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	Mine and mill	Do.
NERCO Minerals Co	111 SW. Columbia Portland, OR 97201	Surface mine, mill, leach plant.	Owyhee.
Sunshine Mining Co	815 Park Blvd. Suite 100 Boise, ID 83702	Mine, mill, refinery.	Shoshone.
Stone:			
Crushed:			
Ash Grove Cement West Inc	5550 SW. Macadam Ave. Suite 300 Portland, OR 97201	Quarry	Bannock.
DeAtley Co.	Box 648 Lewiston, ID 83501	Quarries	Nez Perce.
Monsanto Co.	Box 816 Soda Springs, ID 83276	Quarry	Caribou.
Seubert Excavators Inc	Box 57 Cottonwood, ID 83522	Quarries	Idaho.
U.S. Forest Service, Region 4	324 25th St. Ogden, UT 84401	do	Various.
Dimension:			
Northern Stone Supply Inc	Box 249 Oakley, ID 83346	Quarry	Cassia.
Vanadium:			
Kerr-McGee Chemical Corp	Box 478 Soda Springs, ID 83276	Plant	Caribou.
Zinc:			
Hecla Mining Co	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	Mine and mill	Shoshone.